



ECONOMIC IMPACTS OF WASHINGTON AIRPORTS

INTRODUCTION

One of a community's biggest assets is its airport. While the speed and quality of air transportation we enjoy today has reduced distances and erased borders, there is another dimension to this phenomenon.

Before the advent of aviation or even the railroads as a common method of transporting passengers and cargo, there was very little interaction between communities. Hence, with the exception of limited trading and the occasional traveler, each community had nearly a closed economy. As the railroads gained popularity, more goods were imported and exported, allowing dollars to flow in and out of communities. For those who had the means, travel by railroad provided not just a faster mode of transportation, but also the ability to acquire goods and services beyond the confines of their communities. As a result, not only did better methods of transportation allow more people to travel farther in less time; they also enabled more money to change hands.

Once air travel became widely accepted and available to the masses, the number of people and the tonnage of cargo routinely being transported increased exponentially. While airports facilitate this commerce, their benefits accrue throughout the rest of the community as well. Funds are spent in direct support of providing aviation services, whether this be in the form of landing fees paid by airlines, general aviation fuel sales, or lease payments by an airport's various tenants. This, however, is only a small portion of the economic impacts generated by the presence of an airport in a given community. Visiting passengers and flight crews spend money in the community and providers of aviation services procure goods in support of their businesses and distribute payroll to their employees. The recipients of these funds in turn make purchases throughout the community in subsequent rounds of spending. In order to quantify the economic benefits Washington's system of airports contribute to the State's economy, an Economic Analysis Study was undertaken by the Washington Department of Transportation (WSDOT), Aviation Division.

The goal of this Study is to determine the initial and subsequent rounds of spending generated by the State's system of airports. As with the Forecast section of this Study, all public-use airports and seaplane bases, with the exception those that are owned and operated by the State, have been included in this Study. It should be noted that the impacts for Seattle-Tacoma International Airport were obtained from the Port of Seattle. The location of the airports included in this Study has been depicted in **Exhibit 2A**.

STUDY APPROACH

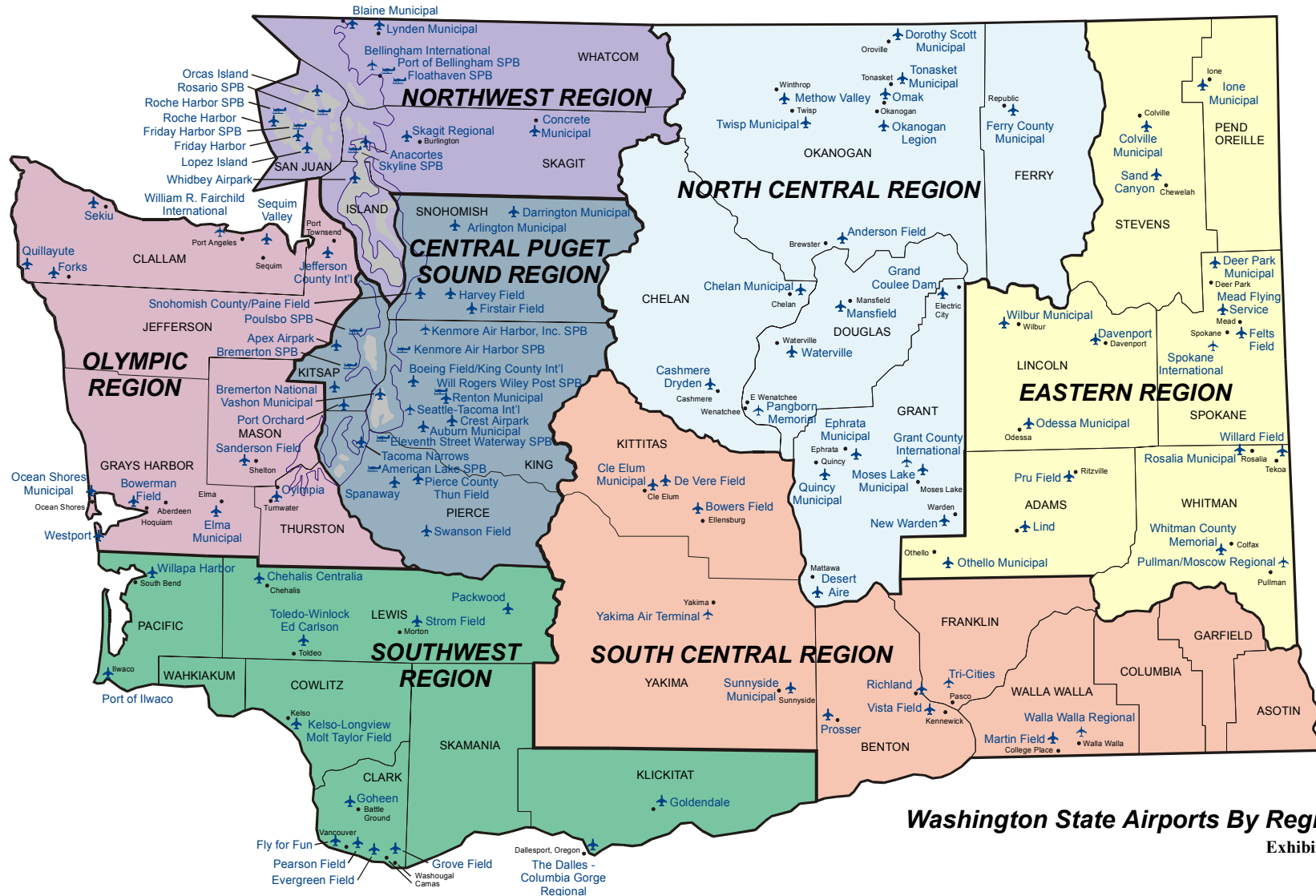
Aviation has played a major role in the nation's economy for a number of years. As has been evidenced by the exponential growth of air cargo during the 1980's and 1990's and the impressive increase in passenger enplanements, the industry will play an even more vital role in the future. This study will, therefore, quantify the economic contribution each airport makes to its community as well the impacts that accrue on the State level from all System airports.





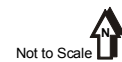
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Washington State Airports By Region

Exhibit 2A



This map is for airport system planning purposes only and is not intended to be used for flight planning or air navigation.





The economic contributions of several aspects of aviation were examined for this Study. These included:

- Airport Operations
- Capital Spending
- On-airport aviation-related businesses and tenants
- Visitors attending aviation events
- Visitors arriving on GA and CS aircraft

SURVEYS OF AVIATION USERS AND PROVIDERS

As is explained further in later sections of this report, in order to gather the necessary data for each airport, surveys were sent to various providers and users of aviation services in Washington. Survey recipients included Washington pilots and aircraft owners, as well as on-airport businesses, airline station managers, and airport managers at the State's airports. Surveys were individually tailored for these groups in order to obtain the desired information from each group.

The information requested from airport managers included aviation activity, the number of workers employed by the airport, expenditures, and capital improvements. For those airports relying on the sponsor (the city or county associated with the airport) to provide services such as maintenance, grass cutting, and snow removal rather than dedicated airport employees, information was gathered to assign a portion of these employees' salaries to the associated airports' impacts. The response goal for this particular survey was 100%; however, as many of the smaller airports and seaplane bases are not staffed, information was either unavailable or no response was received. Follow-up telephone calls were made to airports that had either not responded or whose responses were incomplete. Where sufficient information was not available for a given airport, data from a similarly sized airport, preferably one in the same county or region, was used as a proxy.

Information sought from the airport business surveys included full-time and part-time employment, wages including benefits, and each business's revenues and expenditures. Additionally, the survey also determined the percentage of each business's operations that was dependent on the presence of the airport. These surveys were sent to a list of tenants for each airport obtained from the AirNav website, which is a source of detailed aeronautical information for airports in the United States. Historically, the typical response rate for such surveys is 15 to 20%. Among other reasons, this low response rate is due to many potential respondents either not wanting to take the time to respond, considering such surveys to be an invasion of privacy, and those not wishing to release proprietary information. Hence, despite assurances that responses from individual businesses would not be made public, the response rate for this survey was approximately 21%.

The pilot and aircraft owners' survey sought to quantify Washington pilots' use of airports within the State by polling a representative sample of the population. This survey requested information on travel habits including trip length and expenditures, category of aircraft and plans to upgrade, and frequent destinations.





In order to obtain sufficient information for this Study, a limited number of airport visits had been authorized. Given the amount and quality of information gleaned from the surveys, however, sufficient information was gathered to obviate the need for such visits.

STUDY CONSTRAINTS

Economic impact studies conducted by individual airports often consider the impacts of 100% of their tenants, whether or not a portion of their tenants' operations could be conducted off-airport or are even aviation-related. For the purpose of this Study, the impacts sought for on-airport businesses were only those that depend on the presence of the airport. For many on-airport tenants a large portion of their operations do not depend on the presence of the airport and could be conducted off-site. There are also several non aviation-related airport tenants whose impacts, while important to the community, were not considered in this study.

Another type of economic study closely related to an Economic Analysis study is a cost/benefit analysis. Such studies are conducted to ascertain all of the costs and benefits associated with a given airport and are required by the Federal Aviation Administration for capacity projects in which the sponsor anticipates a need for \$5 million or more in discretionary airport improvement program grants.

One of the unique aspects of a cost/benefit analysis is the consideration of intangible costs and benefits to aviation users such as the time savings resulting from the use of the airport in question compared to the next best alternative. Once quantified, all costs and benefits are then compared in order to determine if such improvements are warranted. As this Economic Analysis Study focuses solely on the actual flow of dollars and jobs generated by the State's airports, intangible benefits have not been considered.

SPECIAL USES OF AVIATION IN WASHINGTON

Aviation contributes to Washington's economy and quality of life in a variety of ways. The State's airports permit the rapid transportation of passengers, cargo, and mail. Time critical items can now be shipped over-night, whereas in the past, such goods may have taken days, if not weeks to reach their destinations. Companies with flight departments can reach out to their customers and clients for face-to-face interactions, which in many cases, cannot be equaled by any other form of communication, no matter how advanced the technology. Much of the activity by small general aviation aircraft is for flight training, which enhances the State's pool of pilots. In addition to these uses, there are other important roles that aviation fills. Some of these are discussed below.

COMMERCE

One of the most significant ways in which aviation plays a part in commerce is the transportation of negotiable instruments. As most of these documents are time-sensitive, transportation time must be kept to a minimum.





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According to one the State's largest banks, cancelled checks and other negotiable instruments are transported between its branches and a processing center in either Seattle or Spokane, depending on the branch's location, via ground courier. If outgoing work from the processing center is bound for a bank branch within that center's territory, it is transported via ground courier.

Items that are to be transported between the bank's Spokane and Seattle processing centers, either as a final destination or for distribution to other bank branches, are shipped via an air courier, who maintains a fleet of aircraft. The air courier has three scheduled flights from Spokane to Seattle and two flights from Seattle to Spokane Monday through Thursday. Since bank branches normally remain open late on Fridays, work from Friday's transactions is transported Saturday morning.

Checks to be transported out of state are picked up by couriers, who depend almost exclusively on the scheduled airlines to transport checks to their final destinations. The vast majority of checks are normally transported to and from Federal Reserve Banks, mainly those in Chicago and Dallas, as well as others on the East Coast. Checks bound for Salt Lake City and points in Idaho are flown by an air courier service who utilizes its own fleet of aircraft.

MEDICINE

Blood Products

There are two blood centers in the State of Washington: Inland Northwest Blood Center and Puget Sound Blood Center. Inland Northwest Blood Center, the smaller of the two, is located in Spokane and serves the eastern portion of the State. Puget Sound Blood Center is located in Seattle and serves the portion of the State west of the Cascade Mountain Range.

Blood shipments to destinations within the State, both from donation sites to the blood centers and from the blood centers to hospitals, are shipped almost exclusively by ground. In times of emergency, blood is occasionally flown via fixed-wing aircraft. Blood is constantly in short supply nationwide and must, therefore, be imported from and exported to other blood centers in the United States, especially during critical shortages. Blood is shipped to and from other parts of the country almost exclusively via FedEx. As whole blood can only be stored for a maximum of 42 days, the Blood Centers typically attempt to export blood nearing its expiration date. Puget Sound Blood Center collects an average of 200,000 units of blood annually. Of this amount, approximately 2% is exported. In addition to accepting, processing, and distributing donated blood, the Puget Sound Blood Center provides blood testing services for hospitals in Eugene, Oregon and Spokane, Washington, as well as those in Alaska and Hawaii.

Donated Tissue

The Northwest Tissue Center, a department of the Puget Sound Blood Center, is a community-sponsored tissue bank and serves hospitals in Washington, Montana, and Idaho. The tissues processed, stored, and distributed by the Tissue Center include bone, skin, heart valves, and tendons, all of which must be harvested within 24 hours of death. The donated tissue is then processed and frozen, and may be stored as long as a month before distribution.





If the donor is not in the Seattle area, the donor tissue is transported to the Tissue Center via chartered aircraft. If the donor is in the Seattle area, the donor is brought to the Tissue Center. Since transplant procedures are almost always conducted on a scheduled basis, the tissue is usually transported via the scheduled airlines. Approximately 75% of donated tissue remains within the region, with the balance being distributed to hospitals in 44 other states.

Donated Organs

Located in Bellevue, Washington, Life Center Northwest serves the transplant organ needs of Alaska, Montana, Northern Idaho, and all of Washington. When donor organs become available, teams are sent to recover the organs, with each team specializing in a different area of the body. As donor organs are in short supply nationwide, it is not unusual for teams recovering different organs from the same donor to be from different areas of the country, each returning organs to their respective region.

Kidneys and pancreases are often transported via commercial airlines under control of the flight crew. Other less stable organs, such as hearts, livers, and lungs, are transported via chartered aircraft. Executive Flight of Wenatchee typically arranges these flights, usually on Lear 25, 35, or Commander aircraft.

For organs whose recipients are in Washington, organ specimens are sent to labs at either Puget Sound Blood Center in Seattle or Inland Northwest Blood Center in Spokane for testing. Organs transported via chartered aircraft arrive at Boeing Field, and are transported to the hospital via ambulance. Any aircraft transporting an organ is given the call sign "Lifeguard" to expedite handling by air traffic controllers.

MEDEVAC

With the State's rural nature and diverse topography, the citizens of Washington depend heavily on emergency air transport services. Of the patients airlifted each year, approximately half are trauma cases, while the balance are airlifted to receive specialized treatment at better equipped hospitals. The specialized types of treatment sought include obstetrics, care at burn centers, various surgical specialties, and neonatal care.

In addition to providing life saving treatment, air ambulance services enable small communities with limited resources to have access to advanced medical treatment without incurring the prohibitively high cost of constructing such facilities.

Emergency department admissions transported by air compose a very small percentage of all admissions. As expected, however, these cases are much more severe in nature. A summary of emergency department admissions from 1996 through 2000 is presented in **Table 2A**.





**TABLE 2A
EMERGENCY DEPARTMENT ADMISSIONS**

Year	All Admissions		Emergency Air Transports		
	Number of Admissions	Average Injury Severity Score*	Number of Air Transports	Percent of Total	Average Injury Severity Score*
1996	9,856	9.494	824	8.4%	16.812
1997	10,760	9.791	822	7.6%	16.753
1998	11,462	9.503	812	7.1%	17.344
1999	12,947	9.028	710	5.5%	16.928
2000	14,952	8.809	757	5.1%	17.097

* A severity scores of 15 or less indicates a minor injury, a score of 16 or greater indicates a major injury.
Source: Office of Emergency Medical/Trauma Prevention, Washington Department of Health

As the table indicates, from 1996 to 2000 the number of total emergency department admissions increased, while the severity of these injuries has decreased from an average severity score of 9.494 in 1996 to 8.809 in 2000. The percentage of these cases transported by air, however, has decreased, while the severity of these cases has increased from an average severity score of 16.812 in 1996 to 17.097 in 2000.

SEARCH AND RESCUE

Searches for Missing and Overdue Aircraft

The federal agency responsible for search and rescue (SAR) is the Air Force Rescue Coordination Center (AFRCC). The AFRCC allows each state to decide which agency will have jurisdiction over SAR operations. In Washington, the Department of Transportation Aviation Division has been granted this authority. The Aviation Division carries out its responsibilities with one dedicated staff member and a volunteer force of more than 400 pilots and support personnel. The primary mission of this force is to respond to reports of missing aircraft within the State.

In addition to SAR, the Aviation Division also investigates signals from emergency locator transmitters (ELT). These devices, which are carried aboard most aircraft and watercraft, emit a signal at the designated emergency frequency of 121.5 megahertz in the event of a mishap. These signals are received by satellites, which are monitored by the United States Mission Control Center in Suitland, Maryland. Upon notification that an ELT signal originating in Washington has been received, the Aviation Division is notified of the approximate location of the signal's origin and begins an immediate investigation. It has been reported that approximately 90% of these reports are resolved simply by a telephone call to an airport or law enforcement agency near the location where the ELT signal originated. Other times, a plane must be dispatched to search the area. It is reported that on average, three ELT signals are received each day. Frequently, the ELT has been activated inadvertently, or activated as the result of a hard, but safe, landing.

Missing aircraft searches are divided into two categories: small scale and full scale. Small-scale searches are those involving mishaps in which searchers have a good indication as to the size





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and location of the search area. It is reported that in Washington, the Aviation Division participates in approximately 10 of these each year. Full-scale searches are those in which an aircraft has been reported missing, but there is little indication of the aircraft's last location. The Aviation Division conducts an average of three full-scale searches each year.

Aerial Searches for Missing Persons

Search and rescue operations for missing persons, including hikers lost in Washington's rugged mountains, are coordinated by local law enforcement agencies, with the county sheriff designated as the incident coordinator. These searches are usually conducted by helicopters or light aircraft operated by the Sheriff's Department or other local law enforcement agency. In Washington, the Civil Air Patrol does not participate in search and rescue operations.

Given the height of Washington's mountains (Mt. Rainier is 14,410 feet above sea level), many locations are unreachable by non-pressurized aircraft. Therefore, helicopters from nearby military bases are occasionally dispatched to participate in a search.

U.S. Coast Guard Participation

The United States Coast Guard is tasked with maritime SAR operations, which extend from the high-tide line seaward. There are two Coast Guard air stations serving Washington's coastline. Air Station Port Angeles is responsible for the coastline between the Canadian Border and the Queets River, as well as Puget Sound and the San Juan Islands and operates a fleet of three HH-65A Dolphin helicopters. Located in Astoria, Washington, Air Station Astoria protects Washington's coastline between the Columbia River and the Queets River with a fleet of three HH-60J Jayhawk helicopters.

While the Coast Guard is tasked with maritime search and rescue operations, it has no jurisdiction inland of the high tide line. If a local or State agency deems that Coast Guard assistance is necessary, the agency must first contact the AFRCC to request assistance. This requesting agency will usually also place a courtesy call to the Coast Guard to prepare them for the potential mission. After evaluating the situation, the AFRCC will oftentimes dispatch the Coast Guard to participate in the search. It is estimated that, of all Coast Guard aerial SAR operations, approximately 5 percent are inland searches.

FORESTRY AND WILDLIFE

Aerial Fire Fighting

As is the case with many western states with vast expanses of forests, forest fires present a serious challenge during the hot weather months. As these fires often encompass large areas, they are often fought by both aircraft and personnel on the ground. The aerial aspect involves the use of aircraft, such as C-130 Hercules, P-3 Orion, and P-2 Neptune aircraft that have been modified for use as aerial tankers; as well as a variety of helicopters, which carry retardant either internally or in slung loads. These aircraft typically dispense a fire fighting agent known as slurry, which due to its thickness, does not disperse as it is dropped.





Another aspect of fighting forest fires involves personnel on the ground, who extinguish hot spots, clear fire breaks, and set back fires as necessary. Due to the mountainous terrain of Washington's forests, it is difficult to insert these personnel by ground vehicle; therefore, teams of fire fighters, known as "smoke jumpers" parachute into remote areas, usually from small aircraft such as DHC-6 Twin Otters.

Coordinating the efforts of the aerial tankers and smoke jumpers are lead aircraft. This function is typically provided by small single or twin-engine aircraft.

Wildlife Tracking

With the abundance of wildlife in Washington, State and federal agencies often find it necessary to track animals to investigate aspects such as population size and migratory patterns. Animals tracked in Washington include deer, moose, elk, fish, and bats. In order to accomplish this, the animal is fitted with a special radio transmitter collar or tag to facilitate identification and tracking. When an update of animal movement is required, an aircraft with tracking equipment is dispatched. Once the equipment has guided the aircraft to the animal, the pilot activates the aircraft's global positioning system equipment to record the animal's location.

OPERATIONAL CHARACTERISTICS OF WASHINGTON'S AIRPORTS

Like the State's diverse topography, each of Washington's airports is unique and plays a variety of roles that reflect the needs and identity of its community and region. In achieving these roles, each airport offers a different mix of services and activities that are supported by the airport's staff and tenants. These characteristics were gathered from a variety of sources including the FAA Airport/Facility Directory; FAA Form 5010, Master Record, for each airport; and surveys completed by airport managers and tenants. These characteristics have been summarized in **Appendix A**.

This Appendix groups each airport's characteristics into four categories: Role, which identifies the level of need the airport fulfills; Airport Services, which indicates what services are offered at the airport; Special Operations and Events, identifying selected aviation sectors based on operating at the airport; and Specialized Industries, indicating aviation-related entities who depend on the airport to further their interests.

ECONOMIC IMPACTS OF WASHINGTON'S AIRPORTS

As was demonstrated above, the airports in each county contribute to the economy of their respective county and region. Depending on the Airport's role and activity level, each individual airport contributes impacts to its community, and perhaps to surrounding communities and the State as a whole. The purpose of this section is to quantify these benefits in tabular form to better understand each airport's contribution to its community and to facilitate comparison between airports. In order to determine the economic impacts of Washington's airports, information from each airport was gathered by survey, as well as from various publications describing the activity levels and facilities at each airport. This information was used as an input to the IMPLAN model, which estimates economic impacts based on demographic information.





The consulting firm - Economic + Environmental Consulting Services - was instrumental in compiling this information. A summary of their efforts and results has been included as an attachment to this report.

For the purpose of this Study, airports are classified as general aviation (GA) or commercial service (CS) airports. General aviation encompasses all of aviation with the exception of the certificated air carriers and the military. Commercial service airports, as the name implies, accommodate air carrier activity in addition to general aviation traffic; however, in order to be considered a commercial service airport, at least 2,500 passengers must be enplaned at the facility annually. Therefore, those airports served by air carriers with at least 2,500 annual enplanements are classified as commercial service airports; those enplaning fewer than 2,500 are categorized as general aviation airports. Those commercial service airports enplaning 10,000 or more passengers annually are classified as primary commercial service airports, while those enplaning at least 2,500 but fewer than 10,000 passengers annually are classified as commercial service-other airports. The biggest benefit for facilities designated as primary commercial service airports is their eligibility for entitlement funding. This funding, the amount of which is determined by a formula based on the number of annual enplaned passengers, is from the Airport and Airway Trust Fund which is funded by taxes on aviation goods and services. The minimum entitlement funding for primary commercial service airports is \$500,000. However, as a provision of the Aviation Investment and Reform Act for the 21st Century (AIR 21), this amount increases to \$1,000,000 for those years in which the Airport Improvement Program (AIP) is authorized for at least \$3.2 billion.

IMPACTS FROM VISITORS ARRIVING VIA GENERAL AVIATION AND COMMERCIAL AIRCRAFT

All commercial service and general aircraft operating at the State's airports contribute to Washington's economy as well as that of the community and region. While there is spending associated with local passengers and flight crews arriving at and departing from the State's airports, this money originates from within the community and region. Visitors arriving at Washington's airports, however, spend far greater amounts on necessities such as lodging, meals, ground transportation, and retail purchases. More significantly, money for these expenditures originates from outside the community, thus having a far-reaching effect as this money circulates throughout the State's economy in subsequent rounds of spending known as the multiplier effect. Hence, any attempt to quantify the impact of passengers' expenditures should focus on the visiting passengers and flight crews arriving at Washington's airports.

IMPACTS FROM VISITORS ARRIVING VIA GENERAL AVIATION AIRCRAFT

As the actual number of arrivals by visiting aircraft is unknown, a series of assumptions was made. First, recognizing that the percentage of arriving aircraft considered to be visiting a given airport varies by airport. Therefore, the percentage of aircraft considered to be visiting was determined based on the total number of arriving general aviation aircraft. Thus it was assumed that the percentage of visiting aircraft for airports with: fewer than 1,000 annual arrivals was 35%; 40% for airports with at least 1,000 arrivals, but less than 5,000; 50% for airports with at least 5,000 arrivals, but fewer than 10,000; and 55% for airports with more than 10,000 annual arrivals.





PERCENT OF ARRIVALS BY VISITING AIRCRAFT	
Number of Arrivals	Percent assumed by Visiting Aircraft
Less than 1,000	35%
1,000 or greater, but less than 5,000	40%
5,000 or greater, but less than 10,000	50%
Greater than 10,000	55%

Next, the spending patterns for pilots and their passengers was obtained from the aircraft owner/pilot survey. These are as follows:

AVERAGE EXPENDITURE PER TRIP FOR VISITING GENERAL AVIATION AIRCRAFT	
Expenditure	Amount
Lodging	\$284
Food and Beverages	109
Retail Goods	95
Entertainment	117
Transportation Rental	131
Total	\$736

As this table indicates, total expenditures by occupants of visiting aircraft is approximately \$736. From the pilot survey, it was determined that aircraft arriving at Washington airports do so with an average of 1.8 occupants on-board, including the pilot. Hence, based on spending of \$736 per arriving aircraft, average spending per person is approximately \$409. The preceding information was used to calculate the number of arrivals by visiting aircraft, general aviation visitors, and spending by visitors. This information is summarized for each airport in **Appendix B**. Impacts per million dollars of spending by general aviation visitors was calculated by dividing spending by visitors at each airport by 1,000,000. **Table 2B** is the impact per million dollars in visitor spending for each impact category. This was calculated based on the results of the pilot survey and information obtained from IMPLAN. This was based on total spending being weighted as follows: Lodging, 39%; entertainment, 16%; food and beverage, 15%; and retail purchases composing 13% of total spending. Impacts per million dollars for each airport was then multiplied by impacts per million dollars in visitor spending for direct, indirect, and induced impacts for employment, wages, and output. These results have been presented in **Appendices C, D, and E**.





TABLE 2B			
IMPACTS PER MILLION DOLLARS IN VISITOR SPENDING*			
EMPLOYEE COMPENSATION			
Direct	Indirect	Induced	Total
\$235,209	\$64,177	\$71,150	\$370,536
EMPLOYMENT			
Direct	Indirect	Induced	Total
15.3	2.4	2.9	20.7
OUTPUT			
Direct	Indirect	Induced	Total
\$936,550	\$194,845	\$217,411	\$1,348,806

*Estimates of impacts per \$1 million of visitor spending are derived from the Pilot Survey and IMPLAN Model for Washington State.

IMPACTS FROM VISITORS ARRIVING VIA COMMERCIAL SERVICE AIRCRAFT

As with general aviation passengers and crews arriving at Washington airports, visitors arriving on commercial service aircraft spend money on items including accommodations, food and beverages, ground transportation, and retail goods. In order to estimate these expenditures, a few assumptions were made. It was first assumed that 40% of passengers were visitors, while the remaining 60% were drawn from the airport's service area. Enplanements, and not deplanements, are tracked by the Federal Aviation Administration; therefore, it was assumed that enplanements equal deplanements; therefore, expenditures were estimated per enplanement for each airport. It was further assumed that the average visitor spends approximately \$675 dollars during each visit. Due to more spending opportunities and the higher cost of living in Spokane and Seattle, spending per trip was estimated at \$750 for visitors arriving at Spokane International Airport and \$880 at Seattle-Tacoma International Airport. This, along with impact per million dollars, has been summarized in **Table 2C**. **Tables 2D, 2E, and 2F** summarize the direct, secondary, and total impacts for wage, employment, and output for each commercial service airport. It should be noted that the same impacts per million dollars in spending that was applied to general aviation visitor spending was applied to commercial service visitor spending.





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**TABLE 2C
SPENDING BY COMMERCIAL SERVICE VISITORS**

Associated City	Airport	Visitors	Spending per Trip	Total Spending	Impact Per \$Million
Anacortes	Anacortes	2,862	\$675	\$1,931,850	\$1.93
Bellingham	Bellingham International	34,796	\$675	\$23,487,300	\$23.49
Friday Harbor	Friday Harbor	4,602	\$675	\$3,106,350	\$3.11
Friday Harbor	Friday Harbor SPB	2,476	\$675	\$1,671,300	\$1.67
Kenmore	Kenmore Air Harbor	5,623	\$675	\$3,795,390	\$3.80
Moses Lake	Grant County	4,292	\$675	\$2,897,100	\$2.90
East Sound	Orcas Island	3,809	\$675	\$2,571,210	\$2.57
Pasco	Tri-Cities	76,920	\$675	\$51,921,270	\$51.92
Port Angeles	William Fairchild	9,951	\$675	\$6,717,060	\$6.72
Pullman-Moscow, ID	Pullman-Moscow	10,788	\$675	\$7,281,630	\$7.28
Roche Harbor	Roche Harbor SPB	600	\$675	\$405,000	\$0.41
Rosario	Rosario SPB	600	\$675	\$405,000	\$0.41
Seattle	Boeing Field	1,127	\$675	\$760,860	\$0.76
Seattle - Lake Union	Kenmore Air Harbor	1,400	\$675	\$945,000	\$0.95
Seattle	Seattle-Tacoma International	5,669,501	\$880	\$4,989,160,704	\$4,989.16
Sequim	Sequim Valley	300	\$675	\$202,500	\$0.20
Spokane	Spokane International	589,160	\$750	\$441,870,300	\$441.87
Walla Walla	Walla Walla	9,678	\$675	\$6,532,380	\$6.53
Wenatchee	Pangborn Memorial	21,260	\$675	\$14,350,230	\$14.35
Yakima	Yakima	34,909	\$675	\$23,563,440	\$23.56
	Total	6,484,654		\$5,583,575,874	\$5,583.58
	Total Without Sea-Tac	815,153		\$594,415,170	\$594.42

**TABLE 2D
WAGE IMPACTS FROM COMMERCIAL SERVICE VISITORS**

Associated City	Airport	EMPLOYEE COMPENSATION			
		Direct	Indirect	Induced	Total
Anacortes	Anacortes	\$454,389	\$123,980	\$137,451	\$715,820
Bellingham	Bellingham International	\$5,524,424	\$1,507,344	\$1,671,121	\$8,702,890
Friday Harbor	Friday Harbor	\$730,641	\$199,356	\$221,017	\$1,151,015
Friday Harbor	Friday Harbor SPB	\$393,105	\$107,259	\$118,913	\$619,277
Kenmore	Kenmore Air Harbor	\$892,710	\$243,577	\$270,042	\$1,406,329
Moses Lake	Grant County	\$681,424	\$185,927	\$206,129	\$1,073,480
East Sound	Orcas Island	\$604,772	\$165,013	\$182,942	\$952,726
Pasco	Tri-Cities	\$12,212,350	\$3,332,151	\$3,694,198	\$19,238,700
Port Angeles	William Fairchild	\$1,579,913	\$431,081	\$477,919	\$2,488,913
Pullman-Moscow, ID	Pullman-Moscow	\$1,712,705	\$467,313	\$518,088	\$2,698,106
Roche Harbor	Roche Harbor SPB	\$95,260	\$25,992	\$28,816	\$150,067
Rosario	Rosario SPB	\$95,260	\$25,992	\$28,816	\$150,067
Seattle	Boeing Field	\$178,961	\$48,830	\$54,135	\$281,926
Seattle - Lake Union	Kenmore Air Harbor	\$222,273	\$60,647	\$67,237	\$350,157
Seattle	Seattle-Tacoma International	\$1,173,495,500	\$320,189,367	\$354,978,784	\$1,848,663,651
Sequim	Sequim Valley	\$47,630	\$12,996	\$14,408	\$75,034
Spokane	Spokane International	\$103,931,871	\$28,357,910	\$31,439,072	\$163,728,853
Walla Walla	Walla Walla	\$1,536,475	\$419,229	\$464,779	\$2,420,482
Wenatchee	Pangborn Memorial	\$3,375,303	\$920,955	\$1,021,019	\$5,317,277
Yakima	Yakima	\$5,542,333	\$1,512,231	\$1,676,539	\$8,731,103
	Total	\$1,313,307,298	\$358,337,149	\$397,271,423	\$2,068,915,870
	Total Without Sea-Tac	\$139,811,798	\$38,147,782	\$42,292,639	\$220,252,219





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TABLE 2E EMPLOYMENT IMPACTS FROM COMMERCIAL SERVICE VISITORS					
Associated City	Airport	EMPLOYMENT			
		Direct	Indirect	Induced	Total
Anacortes	Anacortes	29.6	4.6	5.6	40.0
Bellingham	Bellingham International	359.4	56.4	68.1	486.2
Friday Harbor	Friday Harbor	47.5	7.5	9.0	64.3
Friday Harbor	Friday Harbor SPB	25.6	4.0	4.8	34.6
Kenmore	Kenmore Air Harbor	58.1	9.1	11.0	78.6
Moses Lake	Grant County	44.3	7.0	8.4	60.0
East Sound	Orcas Island	39.3	6.2	7.5	53.2
Pasco	Tri-Cities	794.4	124.6	150.6	1,074.8
Port Angeles	William Fairchild	102.8	16.1	19.5	139.0
Pullman-Moscow, ID	Pullman-Moscow	111.4	17.5	21.1	150.7
Roche Harbor	Roche Harbor SPB	6.2	1.0	1.2	8.4
Rosario	Rosario SPB	6.2	1.0	1.2	8.4
Seattle	Boeing Field	11.6	1.8	2.2	15.7
Seattle - Lake Union	Kenmore Air Harbor	14.5	2.3	2.7	19.6
Seattle	Seattle-Tacoma International	76,334.2	11,974.0	14,468.6	103,275.6
Sequim	Sequim Valley	3.1	0.5	0.6	4.2
Spokane	Spokane International	6,760.6	1,060.5	1,281.4	9,146.7
Walla Walla	Walla Walla	99.9	15.7	18.9	135.2
Wenatchee	Pangborn Memorial	219.6	34.4	41.6	297.0
Yakima	Yakima	360.5	56.6	68.3	487.8
	Total	85,429	13,401	16,192	115,580
	Total Without Sea-Tac	9,094.6	1,426.6	1,723.8	12,304.4

TABLE 2F OUTPUT IMPACTS FROM COMMERCIAL SERVICE VISITORS					
Associated City	Airport	OUTPUT			
		Direct	Indirect	Induced	Total
Anacortes	Anacortes	\$1,809,274	\$376,411	\$420,005	\$2,605,691
Bellingham	Bellingham International	\$21,997,031	\$4,576,383	\$5,106,397	\$31,679,811
Friday Harbor	Friday Harbor	\$2,909,252	\$605,257	\$675,355	\$4,189,864
Friday Harbor	Friday Harbor SPB	\$1,565,256	\$325,644	\$363,359	\$2,254,259
Kenmore	Kenmore Air Harbor	\$3,554,573	\$739,513	\$825,160	\$5,119,245
Moses Lake	Grant County	\$2,713,279	\$564,485	\$629,861	\$3,907,626
East Sound	Orcas Island	\$2,408,067	\$500,987	\$559,009	\$3,468,063
Pasco	Tri-Cities	\$48,626,865	\$10,116,600	\$11,288,255	\$70,031,721
Port Angeles	William Fairchild	\$6,290,863	\$1,308,786	\$1,460,363	\$9,060,011
Pullman-Moscow, ID	Pullman-Moscow	\$6,819,611	\$1,418,789	\$1,583,106	\$9,821,506
Roche Harbor	Roche Harbor SPB	\$379,303	\$78,912	\$88,051	\$546,266
Rosario	Rosario SPB	\$379,303	\$78,912	\$88,051	\$546,266
Seattle	Boeing Field	\$712,583	\$148,250	\$165,419	\$1,026,253
Seattle - Lake Union	Kenmore Air Harbor	\$885,040	\$184,129	\$205,453	\$1,274,622
Seattle	Seattle-Tacoma International	\$4,672,598,457	\$972,113,017	\$1,084,698,418	\$6,729,409,893
Sequim	Sequim Valley	\$189,651	\$39,456	\$44,026	\$273,133
Spokane	Spokane International	\$413,833,629	\$86,096,219	\$96,067,464	\$595,997,312
Walla Walla	Walla Walla	\$6,117,900	\$1,272,802	\$1,420,211	\$8,810,913
Wenatchee	Pangborn Memorial	\$13,439,708	\$2,796,071	\$3,119,898	\$19,355,676
Yakima	Yakima	\$22,068,340	\$4,591,218	\$5,122,951	\$31,782,509
	Total	\$5,229,297,985	\$1,087,931,841	\$1,213,930,814	\$7,531,160,640
	Total Without Sea-Tac	\$556,699,527	\$115,818,824	\$129,232,397	\$801,750,748





TOTAL ECONOMIC IMPACTS

The presence of an airport in a given community typically results in increased economic activity as a result of direct and all secondary impacts. The number of aviation-related jobs are increased as aviation activity increases, as are wages and spending by aviation providers and support entities, serving as prime examples of direct economic impacts. As was mentioned in the previous section, the increased goods and services purchased by visitors and employees of aviation-related businesses result in subsequent rounds of spending.

It should be noted that impacts for Seattle-Tacoma International Airport were not modeled for this Study. Instead, economic impacts were obtained from a 2000 study by Martin Associates, "The Economic Impacts of the Port of Seattle," which was supplied by the Port of Seattle. The impacts for this report were modeled using Martin Associates' in-house model, which supplied direct, indirect and induced employee and wage impacts, but only direct output. Hence, not all parameters were available for inclusion in this Study. Additionally, since Sea-Tac data were not used as inputs to the IMPLAN model employed in this Study, leakage from King County still remaining within the Central Puget Sound (CPS) region would not accrue to region; likewise, leakage from CPS region remaining within the State would not accrue to the State. Hence, Sea-Tac data were only used in tables displaying total wage, employment, and output impacts for each airport, as well as those not requiring summation of impacts to the regions and State. Additionally, Martin Associates' impacts were supplemented with impacts from the previously referenced general aviation and the air carrier visitor tables and appendices. The economic impacts of Seattle-Tacoma International Airport are as follows:

ECONOMIC IMPACTS OF SEATTLE-TACOMA INTERNATIONAL AIRPORT				
Impact	Direct	Indirect	Induced	Total
Employee Compensation	\$1,838,453,353	\$1,011,606,376	\$755,191,004	\$3,605,250,734
Jobs	94,951.9	22,485.6	28,304.3	146,245.0
Output	\$11,610,648,418	N/A*	N/A*	\$16,926,634,605

Source: Martin Associates; Economic + Environmental Consulting Services

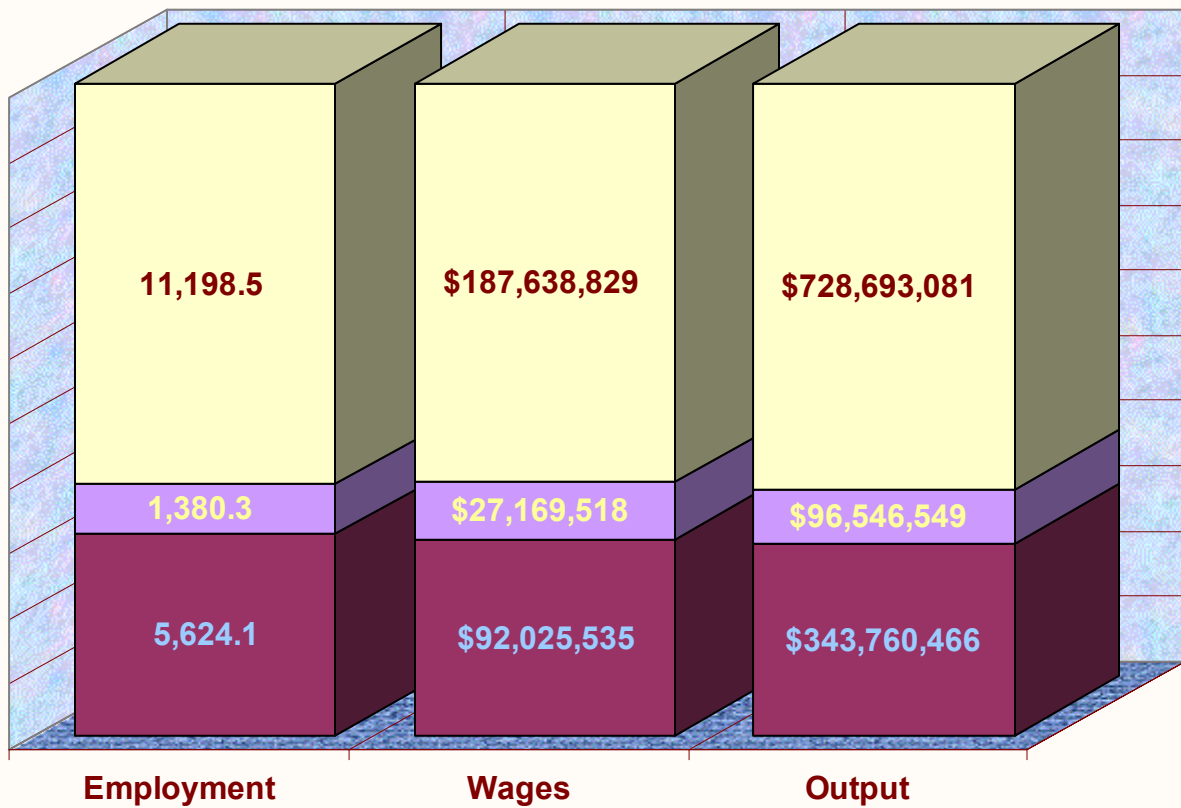
Exhibit 2B is a series of charts depicting the direct, indirect, induced, and total impacts of Washington airports (excluding Sea-Tac) by airport classification. These results are also summarized in **Table 2G**.

Commercial service airports accounted for more than 60% of total employment, wage, and output impacts, while general aviation airports accounted for approximately 30% of these impacts. It should be noted that, due to leakage, the economic benefits resulting from aviation activity at a given airport are usually not confined to the county where they occur. Hence, the total economic impacts for the State (depicted at the bottom of the Table) are greater than the sum of economic benefits for each of the airports included in this Study.





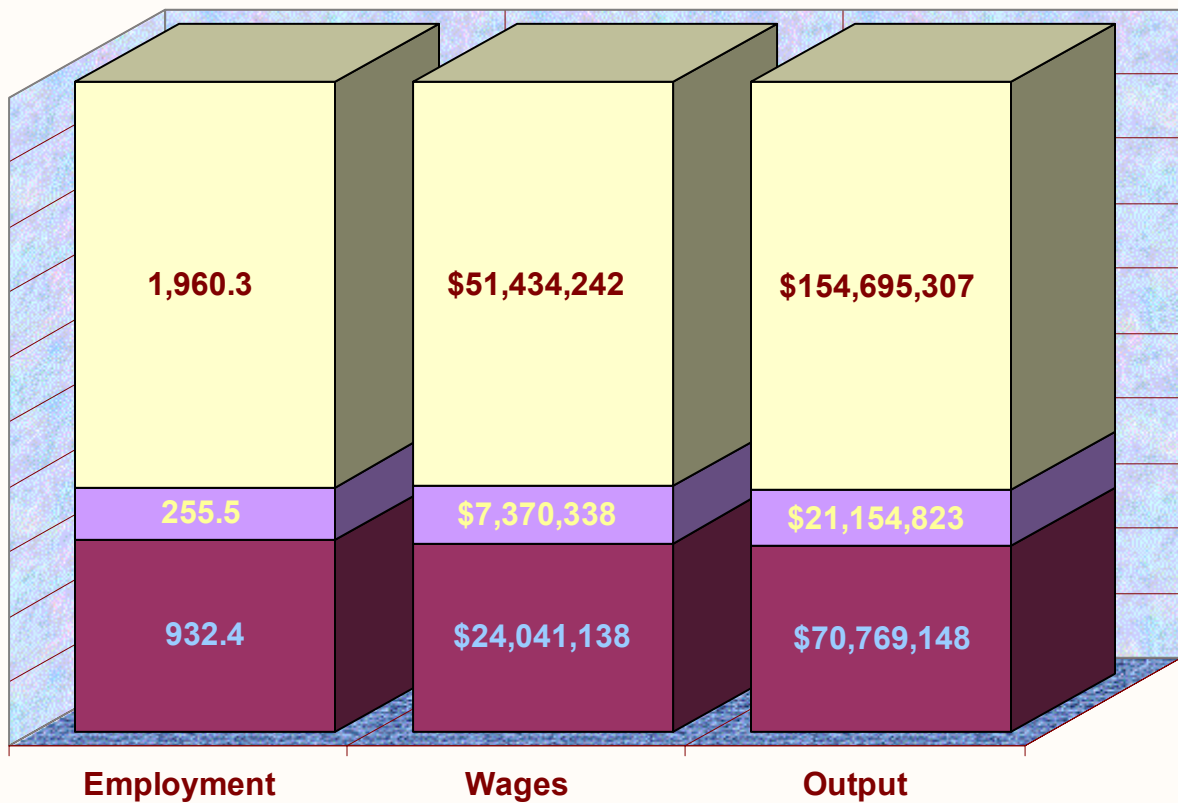
**EXHIBIT 2B
DIRECT ECONOMIC IMPACTS
(NOT INCLUDING SEA-TAC)**



- Primary Commercial Service without Sea-Tac
- Commercial Service - Other
- General Aviation



**EXHIBIT 2B
INDIRECT ECONOMIC IMPACTS
(NOT INCLUDING SEA-TAC)**

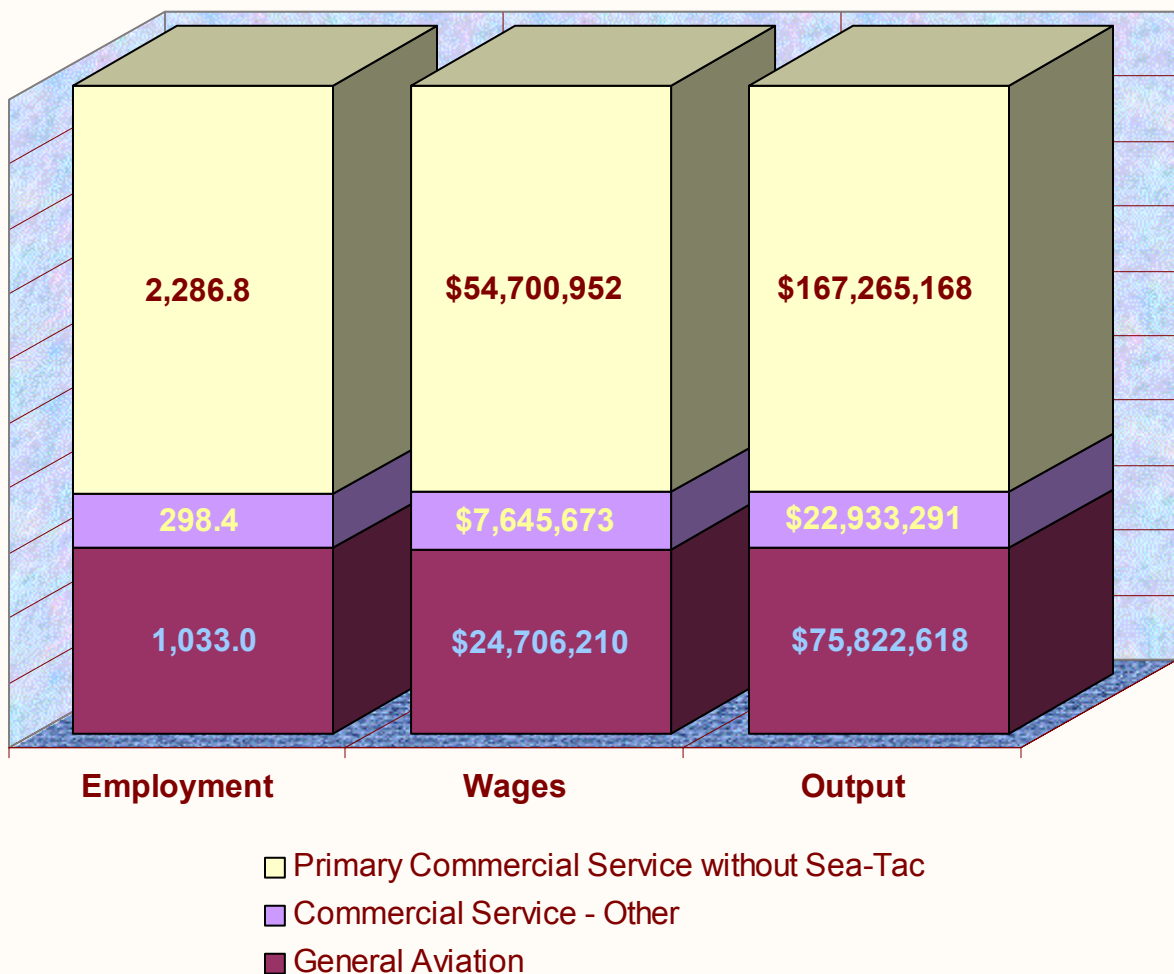


- Primary Commercial Service without Sea-Tac
- Commercial Service - Other
- General Aviation



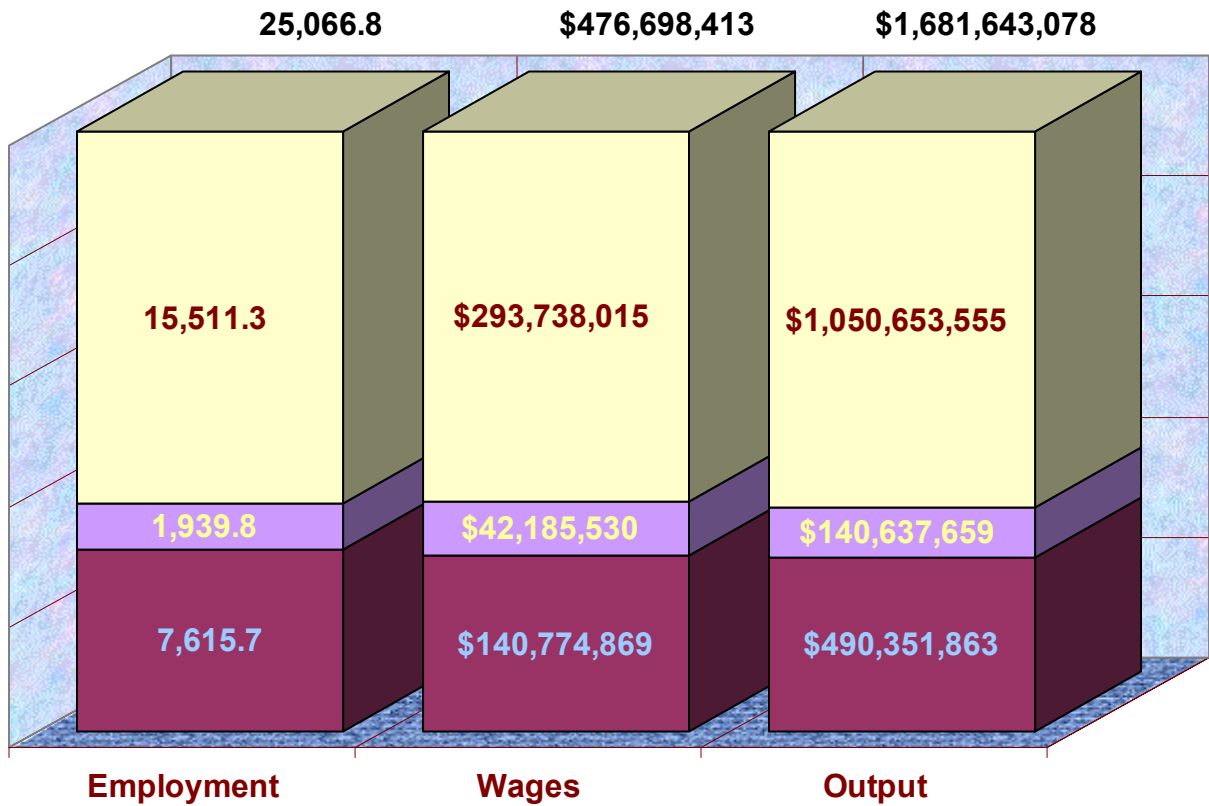


**EXHIBIT 2B
INDUCED ECONOMIC IMPACTS
(NOT INCLUDING SEA-TAC)**





**EXHIBIT 2B
TOTAL ECONOMIC IMPACTS
(NOT INCLUDING SEA-TAC)**



- Primary Commercial Service without Sea-Tac
- Commercial Service - Other
- General Aviation





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TABLE 2G TOTAL ECONOMIC ACTIVITY IMPACTS						
Airport Role	Total Economic Impacts					
	Employment		Wages		Output	
	Jobs	Percent	Dollars	Percent	Dollars	Percent
Not Including Sea-Tac						
General Aviation	7,615.7	30.4%	\$140,774,869	29.5%	\$490,351,863	29.2%
Commercial Service - Other	1,939.8	7.7%	\$42,185,530	8.8%	\$140,637,659	8.4%
Primary Commercial Service without Sea-Tac	15,511.3	61.9%	\$293,738,015	61.6%	\$1,050,653,555	62.5%
Total Without Sea-Tac	25,066.8	100.0%	\$476,698,413	100%	\$1,681,643,078	100%
Including Sea-Tac						
General Aviation	7,615.7	4.4%	140,774,868.9	3.4%	490,351,863.0	2.6%
Commercial Service - Other	1,939.8	1.1%	42,185,529.6	1.0%	140,637,659.4	0.8%
Primary Commercial Service Including Sea-Tac	161,756.2	94.4%	\$3,898,988,749	95.5%	\$17,977,288,161	96.6%
Total Including Sea-Tac	171,311.8	100.0%	4,081,949,147.2	100.0%	\$18,608,277,683	100.0%

Appendices F, G, and H depict the direct, indirect, induced, and total employment, income, and output economic impacts respectively for each individual airport. As these tables demonstrate, while the primary commercial service airports have significant impacts, many of the general aviation and commercial service-other airports have very impressive economic impacts as well. These tables very appropriately demonstrate the contributions general aviation makes to the health of the State's economy.

The total employment, income, and output economic impacts per operation and based aircraft at each airport are represented in **Appendices I and J**. Again, as expected, the impacts per operation and based aircraft at the primary commercial service airports make a substantial contribution to the economy. However, as most commercial service aircraft serving these airports have accommodations for between 19 to 150 passengers versus the 4 to 12 that most general aviation aircraft typically accommodate, impacts at these airports are, as expected, larger than those for general aviation airports. A review of many of the general aviation airports, however, reveals that many of these, despite their size and role, make major contributions to both the local and State economies. Operations forecasts for each airport were multiplied by the impacts per operation in **Appendix J** resulting in a forecast of economic impacts for each airport. These are represented in **Appendices K, L, M, and N** for 2005, 2010, 2015, and 2020 respectively.

Tables 2H, 2I, and 2J depict the employment, wage, and output impacts for each of the seven regions defined in this Study. As was the case for the individual airport totals and total impacts for the State, spill-over economic benefits extend beyond each region and accrue at the state level. Hence, all of the statewide impacts are larger than the total of impacts for each region.





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**TABLE 2H
REGIONAL EMPLOYMENT IMPACTS ***

Region	Jobs			
	Direct	Indirect	Induced	Total
Central Puget Sound	4,305.2	829.6	917.9	6,069.0
Eastern	8,013.5	1,363.0	1,650.3	11,075.1
North Central	968.3	186.0	196.9	1,356.2
Northwest	1,480.5	260.2	296.5	2,045.9
Olympic	687.4	110.7	128.7	930.0
South Central	2,141.3	384.6	442.6	2,980.5
Southwest	665.9	104.6	122.9	897.1
Total of Individual Regions	18,262.2	3,238.7	3,755.7	25,353.8
Washington Employment Impacts	18,893.0	3,351.8	3,962.2	26,308.5

* Not including Sea-Tac

**TABLE 2I
REGIONAL WAGE IMPACTS***

Region	Wages			
	Direct	Indirect	Induced	Total
Central Puget Sound	\$80,612,007	\$23,658,847	\$23,164,549	\$127,435,408
Eastern	\$131,594,451	\$35,710,959	\$39,481,632	\$206,787,040
North Central	\$17,178,060	\$4,502,628	\$4,492,980	\$26,173,666
Northwest	\$24,095,625	\$6,662,273	\$6,959,451	\$37,717,346
Olympic	\$10,752,655	\$2,824,156	\$3,051,676	\$16,628,487
South Central	\$35,985,020	\$10,014,197	\$10,355,467	\$56,354,682
Southwest	\$10,188,494	\$2,748,499	\$2,970,199	\$15,907,192
Total of Individual Regions	\$310,406,312	\$86,121,559	\$90,475,955	\$487,003,822
Washington Wage Impacts	\$321,295,770	\$91,774,217	\$96,668,659	\$509,738,642

* Not including Sea-Tac

**TABLE 2J
REGIONAL OUTPUT IMPACTS***

Region	Output			
	Direct	Indirect	Induced	Total
Central Puget Sound	\$288,738,200	\$65,112,551	\$69,588,492	\$423,439,242
Eastern	\$515,028,372	\$108,790,528	\$120,599,641	\$744,418,540
North Central	\$64,842,516	\$13,502,511	\$13,899,967	\$92,244,991
Northwest	\$94,459,188	\$20,431,043	\$21,584,536	\$136,474,766
Olympic	\$42,948,882	\$8,485,103	\$9,363,018	\$60,797,004
South Central	\$138,262,737	\$29,923,511	\$31,837,143	\$200,023,031
Southwest	\$40,810,449	\$8,264,630	\$9,100,470	\$58,175,550
Total of Individual Regions	\$1,185,090,344	\$254,509,877	\$275,973,266	\$1,715,573,124
Washington Output Impacts	\$1,223,488,447	\$271,200,577	\$295,457,799	\$1,790,146,469

* Not including Sea-Tac





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Appendix O lists the economic impacts for each airport by airport reference code (ARC), as well as the total and average impacts of airports included in each ARC. This information has also been summarized in **Table 2K**. As the Table indicates, the airports in ARC C-I had the smallest employment, wage, and output impacts. Tacoma Narrows, the only airport in ARC C-I, had the highest average employment impact, while Walla Walla Regional Airport, the only airport in ARC D-IV, had the highest average wage and output impacts.

Table 2K*			
AVERAGE OF INDIVIDUAL AIRPORT IMPACTS BY ARC			
Airport Reference Code (ARC)	Employment	Wages	Output
ARC A-I	1,422.9	\$27,099,773	\$95,137,980
ARC A-II	299.0	\$5,341,231	\$19,502,584
ARC B-I	2,732.9	\$47,430,414	\$169,334,475
ARC B-II	2,899.6	\$52,550,292	\$184,859,471
ARC B-III	632.6	\$13,711,450	\$47,737,185
ARC C-I	8.9	\$146,136	\$519,004
ARC C-II	534.1	\$11,391,760	\$33,386,332
ARC C-III	13,566.1	\$253,643,208	\$909,336,141
ARC C-IV	408.6	\$8,307,455	\$30,646,570
ARC D-IV	1,437.6	\$33,274,317	\$108,284,742
ARC D-V**	147,368.9	\$3,629,053,112	\$17,009,533,197
Total	171,311.1	\$4,081,949,148	\$18,608,277,682

* See **Appendix K** for a complete break-down of impacts for each airport by ARC

** Includes Sea-Tac

Table 2L summarizes the total impacts for the State, regions, and individual airports (not including Sea-Tac). As was mentioned earlier, leakage on the county level is often captured at the regional level; likewise, leakage at the regional level is often captured at the State level. Hence, the State impacts are usually greater than the sum of the regional impacts, which are usually greater than the sum of the individual airport impacts.

TABLE 2L			
TOTAL IMPACTS SUMMARY*			
Total Impacts	Employment	Wages	Output
Sum of Airport Impacts	25,066.3	\$476,698,414	\$1,681,643,077
Sum of Region Impacts	25,353.8	\$487,003,822	\$1,715,573,124
State Impacts	26,308.5	\$509,738,642	\$1,790,146,469

* Not including Sea-Tac





CONCLUSION

As this Study has demonstrated, the State's airports provide more than just a place for aircraft to take off and land and a means to transport passengers and cargo, they serve as economic engines on the local, regional, and State levels. These airports and their associated aviation-related tenants benefit the local economy by providing goods and services, generating lease payments, and paying wages to employees. These first-round spending impacts, however, are only a small portion of the economic benefits generated by these airports. Secondary impacts include indirect and induced impacts. Indirect impacts occur as a result of aviation, including hotels, restaurants, and travel agencies. Induced impacts are the subsequent rounds of spending and employment referred to as the multiplier effect, which result from the input of money from direct and indirect impacts. Together, direct, indirect, and induced impacts equal the total economic impact of a given airport. Given the 171,312 employees with earnings of \$4,081,949,147 and the output of \$18,608,277,683 resulting from the State's airports (including Sea-Tac), it can be concluded that aviation plays an extraordinarily significant role in the State's economy.





ECONOMIC IMPACTS OF INDIVIDUAL AIRPORTS

Washington's system of airports forms a synergistic relationship with State and regional economies; that is, the whole is greater than the sum of the parts. This is also the case in counties served by multiple airports of varying roles. However, many of the State's airports are located a considerable distance apart, hence isolating their economic impacts. Recognizing this, each of the 115 Study airports is considered separately in this section.

This section provides a brief description of each airport, including based aircraft, operations, and airfield facilities. For airports with any type of scheduled commercial service, a description of this service, including air carriers, destinations, and enplanements, has been provided. The airports described in this section have been arranged alphabetically by region. **Appendix O** is a glossary of terms and acronyms used in this section.

